QA:NA

MOL.20070613.0002

DOE/EIS-0287-SA-01

SUPPLEMENT ANALYSIS

For The

Idaho High-Level Waste and Facilities Disposition Final Environmental Impact Statement

June 2005

United States Department of Energy
Idaho Operations Office

TABLE OF CONTENTS

List of References

1- DOE 2002 – Idaho High-Level Waste and Facilities Disposition Final Environmental Impact Statement, DOE/EIS-0287, September 2002

2- BBWI 2004 - INEEL-EXT-2000-01378 Rev. 4, "Feed Composition for the Sodium Bearing Waste Treatment Process" dated June 2004

3- BBWI 2005a – INEEL/EXT-98-00455, Revision 2, Calcined Waste Storage at the Idaho Nuclear Technology and Engineering Center, M.D. Staiger and M.C. Swensen, dated January 2005

4- BBWI 2005b – Bechtel BWXT Idaho, LLC, Letter report, CCN 55532, J.H. Valentine, Clean/Close INTEC, Idaho Completion project to Frank Holmes, Acting Director, Facilities and Materials Disposition Project, DOE-NE-ID, dated April 21, 2005

5- NE-ID 2005a - Comparison of Radiological Risk Information Presented in the Idaho High-Level Waste and Facilities Disposition Final Environmental Impact Statement (FEIS) versus New EH Guidance for Calculation of Potential Latent Cancer Fatalities issued in 2003 (FMDP-MTPP-05-003), dated March 30, 2005

6- NE-ID 2005b - Comparison of Worker Safety Impact Information Presented in the Idaho High-Level Waste and Facilities Disposition Final Environmental Impact Statement (FEIS) versus 2004 CAIRS Information From CAIRS Database (FMDP-MTPP-05-002)

7- CWI-2005 - CH2M-WG Idaho, LLC Letter report, CCN 300158, J.W. French, Program Manager, INTEC Liquid Waste Facilities Closure, Idaho Cleanup Project to Joel, T. Case, Acting Director, Facilities and Materials Disposition Project, DOE-NE-ID, dated May 13, 2005

List of Figures

List of Tables

1.0 Introduction

In October 2002, DOE issued the *Idaho High-Level Waste and Facilities Disposition Final Environmental Impact Statement (Final EIS)* (DOE 2002) that provided an analysis of the potential environmental consequences of alternatives/options for the management and disposition of Sodium Bearing Waste (SBW), High-Level Waste (HLW) calcine, and HLW facilities at the Idaho Nuclear Technology and Engineering Center (INTEC) located at the Idaho National Engineering and Environmental Laboratory (INEEL), now known as the Idaho National Laboratory (INL) and referred to hereafter as the Idaho Site. Subsequent to the issuance of the Final EIS, DOE included the requirement for treatment of SBW in the Request for Proposals for Environmental Management activities on the Idaho Site. The new Idaho Cleanup Project (ICP) Contractor identified Steam Reforming as their proposed method to treat SBW; a method analyzed in the Final EIS as an option to treat SBW. The proposed Steam Reforming process for SBW is the same as in the Final EIS for retrieval, treatment process, waste form and transportation for disposal. In addition, DOE has updated the characterization data for both the HLW Calcine (BBWI 2005a) and SBW (BBWI 2004 and BBWI 2005b) and identified two areas where new calculation methods are being used to determine health and safety impacts. Because of those changes, DOE has prepared this supplement analysis to determine whether there are "substantial changes in the proposed action that are relevant to environmental concerns" or "significant new circumstances or information" within the meaning of the Council of Environmental Quality and DOE National Environmental Policy Act (NEPA) Regulations (40 CFR 1502.9 (c) and 10 CFR 1021.314) that would require preparation of a Supplemental EIS. Specifically, this analysis is intended to determine if: 1) the Steam Reforming Option identified in the Final EIS adequately bounds impacts from the Steam Reforming Process proposed by the new ICP Contractor using the new characterization data, 2) the new characterization data is significantly different than the data presented in the Final EIS, 3) the new calculation methods present a significant change to the impacts described in the Final EIS, and 4) would the updated characterization data cause significant changes in the environmental impacts for the action alternatives/options presented in the Final EIS. There are no other aspects of the Final EIS that require additional review because DOE has not identified any additional new significant circumstances or information that would warrant such a review.

2.0 Background

From 1952 to 1991, DOE and its predecessor agencies reprocessed spent nuclear reactor fuel at INTEC on the Idaho Site. The reprocessing operations at INTEC used solvent extraction systems to extract defense-related materials from spent nuclear reactor fuel and, in the process, generated HLW, including hazardous constituents, that was stored in the INTEC Tank Farm Facility. In 1998, DOE completed by calcination treating the liquid waste to a powder waste form stored in the Consolidated Solids Storage Facility, commonly called bin sets. The remaining tank waste called SBW includes some wastes from past spent fuel reprocessing and from decontamination activities, solids in the bottom of the tanks, and trace contamination from first cycle reprocessing extraction waste. The SBW contains large quantities of sodium and potassium nitrates, however the radionuclide concentrations for liquid SBW are generally 10 to 1,000 times less than for liquid HLW. Wastes stored in the Tank Farm Facility continue to be generated from continued maintenance activities, facility decontamination and decommissioning, and other activities.

DOE assumes that the SBW is mixed transuranic waste (contains hazardous and radioactive constituents). If it is determined to be transuranic waste then it may be treated and disposed of at the Waste Isolation Pilot Plant in New Mexico. Otherwise, it would be made ready for disposal in a HLW repository such as the one currently proposed at Yucca Mountain, Nevada.

In 1995, DOE and the State of Idaho entered into a settlement agreement, which, in part, set milestones for the treatment of approximately 4,400 cubic meters of HLW calcine and approximately 900,000 gallons of SBW stored at INTEC.

In 1997, DOE filed a Notice of Intent to complete an environmental impact statement in accordance with the National Environmental Policy Act. In September 1998, the Idaho Operations Office (NE-ID) and the State of Idaho signed a Memorandum of Understanding where the State became a Cooperating Agency. In January 2000, DOE issued the Draft EIS and released the Final EIS in October 2002. The Final EIS reflects changes to the Draft EIS based on public comments, further review by DOE and the State of Idaho, and incorporation of the DOE and State of Idaho preferred alternatives.

The Final EIS provides the analysis of the potential environmental consequences of alternatives for managing HLW calcine, SBW, and newly generated liquid waste at INTEC in liquid and solid forms. The Final EIS also described the analysis of potential environmental impacts of alternatives for the final disposition of HLW management facilities at the INTEC after their missions are completed. After considering comments on the Draft EIS, as well as information on available treatment technologies, DOE and the State of Idaho identified separate preferred alternatives for waste treatment. DOE's preferred alternative for waste treatment is to implement the proposed action with the focus on placing the wastes in forms suitable for disposal where technologies available to meet the performance objectives may be chosen from the action alternatives analyzed in this EIS.

The proposed action consists of five elements to meet the purpose and need for agency action, DOE proposes to: (1) select appropriate technologies and construct facilities necessary to prepare Idaho Nuclear Technology and Engineering Center (INTEC) mixed transuranic waste/SBW for shipment to the Waste Isolation Pilot Plant (WIPP), (2) prepare the mixed HLW calcine to allow disposal in a repository, (3) treat and dispose of associated radioactive wastes, (4) provide safe storage of HLW destined for a repository, and (5) disposition INTEC HLW management facilities when their missions are completed. Alternative/Options not included in DOE's Preferred Alternative are; No Action, storage of calcine in the bin sets for an indefinite period under the Continued Current Operations Alternative, the shipment of calcine to the Hanford Site for treatment under the Minimum INEEL Processing Alternative, and disposal of mixed low-level waste on the INEEL under any alternative.

The State of Idaho's Preferred Alternative for treating mixed transuranic waste/SBW and calcine is vitrification, with or without calcine separations. Under both the DOE and State of Idaho preferred alternatives, newly generated liquid waste would be segregated after 2005, stored or treated directly and disposed of as low-level, mixed low-level, or transuranic waste depending on its characteristics. The objective of each preferred alternative is to have INTEC HLW road ready by a target date of 2035. Both DOE and the State of Idaho identified the same preferred

alternative for facilities disposition, which is to use performance-based closure methods for existing facilities and to design new facilities consistent with clean closure methods.

3.0 Areas of Review

3.1 Proposed Waste Treatment Technology

The Final EIS describes a Steam Reforming Option that would treat SBW stored in the Tank Farm Facility by converting the waste to a solid form using a steam reforming process. DOE determined that it was appropriate to review the steam reforming process proposed by the new ICP Contractor to determine if the estimated impacts from that process are within the range of impacts identified in the Final EIS. The proposed Steam Reforming process for SBW is the same as in the Final EIS for retrieval, treatment process, waste form and transportation for disposal.

3.2 Updated Waste Characterization Data

The SBW and HLW Calcine waste composition data (inventory) presented in the Final EIS was based on process knowledge and limited sampling results. The Final EIS SBW composition data used for impacts to groundwater were based on the No Action Alternative that contained the assumption there were 5 Tank Farm Tanks containing approximately 200,000 gallons each of SBW and 4 inches of solids, approximately 1,000,000 gallons. Since the Final EIS was issued, 7 large tanks and 4 small tanks have been cleaned and the SBW liquids and solids consolidated in 3 tank farm tanks containing approximately 900,000 gallons. During those operations, additional SBW samples were taken and analyzed. The analytical results were then used to update the SBW composition. In addition, DOE also had the opportunity to obtain and analyze additional samples of HLW calcine and update its composition data.

3.3 Latent Cancer Risk Calculation

The Final EIS used a factor of 4×10^{-4} estimated deaths/rem for workers and 5×10^{-4} estimated deaths/rem for population/public to calculate the potential increase of Latent Cancer Fatalities for the various projects analyzed in the Final EIS. After the Final EIS was issued in October 2002, DOE Environmental Safety and Health Office (EH) issued revised guidance on how to calculate the potential for Latent Cancer Fatalities: "As of January 2003, the dose-to-risk conversion factor that should be used for estimating excess cancer deaths from exposure to low dose rates of ionizing radiation is 600 cancer deaths (latent cancer fatalities) per million person-rem total effective dose equivalent (6×10^{-4} deaths/rem). This conversion factor may be applied to the general population and the worker population. Estimates of cancer mortality or morbidity derived from these conversion factors should not be stated using more than one significant digit. (Estimating Radiation Risk from Total Effective Dose Equivalent (TEDE), ISCORS Technical Report No. 1, DOE/EH-412/0015/0802 rev. 1, January 2003)." Because of the change in the recommended method of calculating latent cancer risk, DOE decided to assess the change in potential impacts that would result from applying the new radiation risk factors to the analysis in the Final EIS.

3.4 Worker Lost Work Days Calculation

In 2002, the Occupational Safety and Health Administration changed the method for counting days away, restricted or on job transfer. The method now includes calendar days (including weekends and holidays, but caps at 180 days). This change tends to increase the rates versus years prior to 2002. The use of terms also changed in January 2002. For example, Lost Work Days (LWD) became Days Away, Restricted or on Job Transfer (DART). The DOE Computerized Accident/Incident Recordkeeping and Reporting System (CAIRS) database column headings were changed to reflect this terminology change but the data in the columns is still comparable to that used in the Final EIS. Because of the change in the method of calculating lost worker days, DOE decided to assess the change in impacts.

4.0 Analyses and Discussion

For the purposes of estimating emissions from the proposed steam reforming process, the ICP Contractor used data directly from BBWI 2004. That information was provided to the potential bidders for the Idaho Cleanup Project (ICP) contract and was the best available information at the time. DOE compared the waste composition/inventory data in BBWI 2005b to the data used by the ICP Contractor for emission estimates to determine comparability of the data. The data are substantially the same and therefore the ICP Contractor radiological and chemical emission estimates would not present significantly different results if compared to the updated information in BBWI 2005b. As such, DOE used the emission estimates provided by the ICP Contractor for the proposed steam reforming process to provide the estimate of the emissions.

Because the data is substantially the same for radiological and chemical estimates between BBWI 2004 and the information in BBWI 2005b, DOE decided to use the most current SBW composition data in BBWI 2005b to determine if there are any changes in potential impacts to groundwater from the SBW tank accident scenarios.

4.1 Comparison of Waste Treatment Technologies

Table 1 shows a comparison of the estimated radiological emissions from the ICP Contractor's data with those values found in Table C.2-9 of the Final EIS for the Steam Reforming treatment technology. As shown in the table, all emission estimates from the proposed treatment process are below those identified in the Final EIS.

Table 1 – Comparison of Estimated Emissions of Radionuclides from the Treatment of Sodium Bearing Waste Using Steam Reforming to corresponding Final EIS values Found in Table C.2-9

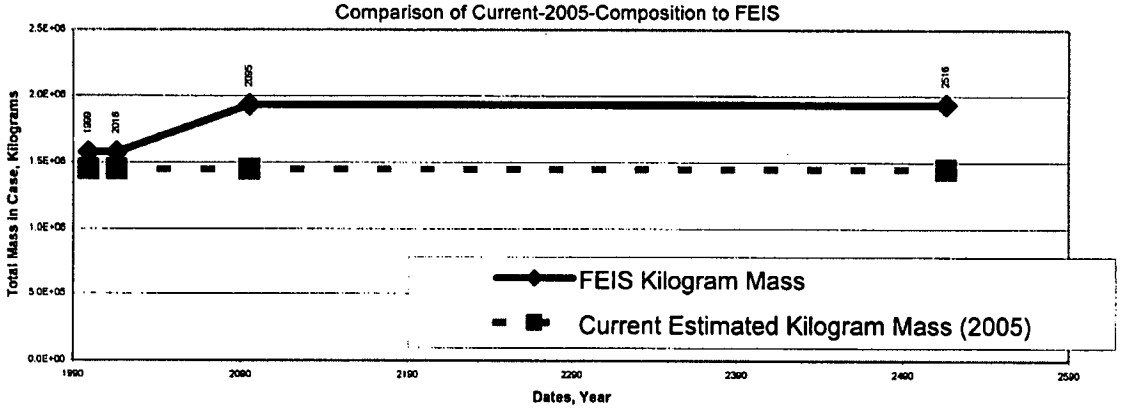
Radionuclide	Model Estimate Ci/y	EIS concentration Ci/y	Comparison <100% is favorable
Cs-134	2.12E-10	7.00E-08	0.30%
Cs-137	2.29E-07	2.80E-05	0.82%
Eu-154	6.03E-10	1.10E-08	5.48%
H-3	2.75E+01	4.50E+01	61.00%
Pu-238	3.47E-09	5.60E-08	6.20%
Pu-239	4.81E-10	6.40E-09	7.52%
Sr-90	1.34E-07	3.50E-06	3.83%

Source: CWI 2005

4.2 Updated Waste Characterization Data

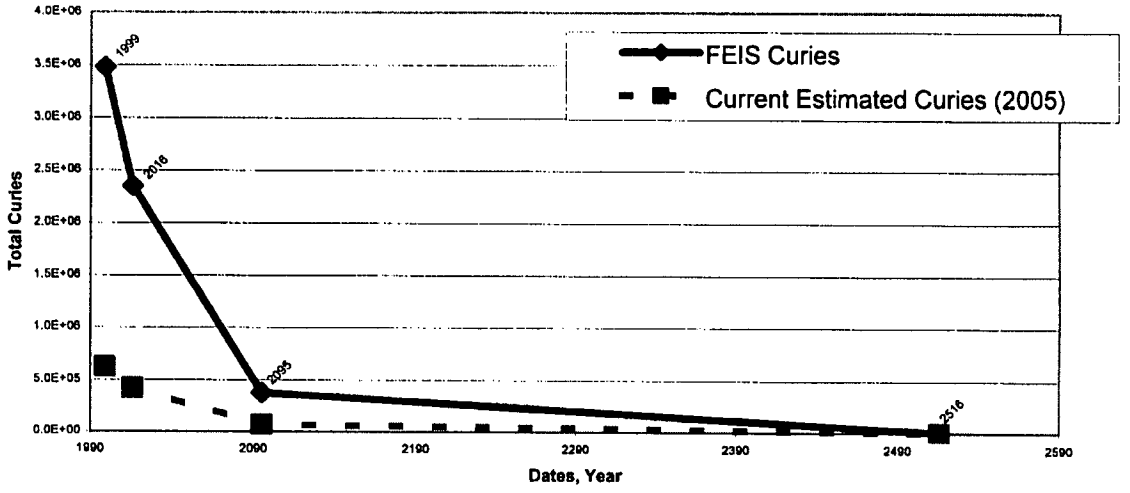
DOE reviewed the latest composition data for HLW Calcine and SBW and compared those data sets with the composition data presented in the Final EIS. The HLW Calcine data showed no significant change in composition. The SBW waste compositions revealed a change in inventory and are presented in Figure 1 and Figure 2 representing the SBW Total Mass in Waste inventory versus time and the SBW Total Curie Inventory Versus Time respectively. The figures provide a comparison of the Total Mass and Total Curie inventory from the Final EIS versus the current 2005-estimated composition. This comparison shows that the 2005 estimated compositions/inventory are well within the Final EIS compositions/inventory. Likewise the estimated composition/inventory data from BBWI 2004 are well within the comparisons shown. Therefore the environmental information presented in the Final EIS is still representative.

Figure 1. Sodium Bearing Waste- Total Mass in Waste Inventory
Comparison of Current-2005-Composition to FEIS



Source: BBWI 2005b

Figure 2. Sodium Bearing Waste--Total Curie Inventory Versus Time
Comparison of Current-2005-Composition to FEIS



Source: BBWI 2005b

Table 2 shows a comparison of the estimated metals emissions from the ICP Contractor's data with those values found in Table C.2-13 of the Final EIS. As shown in the table, all emission estimates from the proposed treatment process are below those identified in the Final EIS.

Table 2 – Comparison of Estimated Emissions of Metals from the Treatment of Sodium Bearing Waste Using Steam Reforming to corresponding Final EIS Values Found in Table C.2-13

Metals	Model Estimate lb/hr	EIS concentration lb/hr	Comparison <100% is favorable	Screening level	Comparison to Screening Level (<100% is favorable)
Cadmium	5.74E-13	8.40E-08	0.0007%	3.70E-06	0.00002%
Chromium	3.38E-12	5.60E-09	0.06%	5.60E-07	0.0006%
Nickel	6.89E-14	5.60E-09	0.001%	2.70E-05	0.0000003%
Chloride	6.63E-03	1.70E-02	39.0%	2.00E-01	3.3%
Fluoride	1.46E-02	1.70E-02	85.9%	1.70E-01	8.6%
Lead	2.53E-13	1.10E-06	0.00002%	n/a	
Mercury	6.10E-04	7.90E-04	77.22%	3.00E-03	20.3%

Source: CWI 2005

Table 3 shows a comparison of the estimated sum of chemical emissions from the ICP Contractor's data with those values found in Table C.2-13 of the Final EIS. As shown in the table, the sum of chemical emission estimates from the proposed treatment process is below that identified in the Final EIS.

Table 3 – Comparison of sum of Estimated Chemical Emissions from the Treatment of Sodium Bearing Waste Using Steam Reforming to corresponding Final EIS Values Found in Table C.2-13

Component	Model Estimate Tons/yr	EIS concentration Tons/yr	Comparison <100% is favorable
Sum of Chemicals	0.05	0.17	31%

Source: CWI 2005

Because the potential emissions from the contractor's steam reforming process were less than those identified in the Final EIS, DOE determined that it was not necessary to perform additional air modeling analysis.

The project information provided by the ICP Contractor for the proposed stream reforming process in the operations phase indicated that the estimated amount of domestic water use during the operations phase will be more than that identified in the Final EIS. The proposed process estimate is 5,920,000 liters/year (1,564,000 gallons) for one year of operations compared to the 1,600,000 liters/year (422,700 gallons) for two years operations estimated in the Final EIS. The total estimated domestic water use (construction, operations, and decontamination and decommissioning) for the proposed Steam Reforming process is estimated to be 19,000,000 liters (5,019,000 gallons) and much less than the estimated 65,000,000 liters (17,170,000 gallons) analyzed in the Final EIS (Appendix C.6, Project Information, Project 2002A). Therefore, DOE does not consider the increase in domestic water usage for the operations phase of the proposed Steam Reforming Process to change the impacts presented in the Final EIS because the total estimated water usage is within that analyzed in the Final EIS and is well within the Federal Reserve Water Right both for gallons per minute (36,000) and the total 11.4 billion gallons per year.

DOE performed a review of the groundwater modeling method used in the Final EIS as it applies to the updated SBW composition/inventory data (BBWI 2005b). Note that the quantity of the SBW is currently approximately 900,000 gallons compared to approximately 1,000,000 gallons in the Final EIS. Because the updated SBW data shows that the quantities of radiological and hazardous constituents are less than originally projected, the potential groundwater impacts from waste remaining in the tanks after closure identified in the Final EIS are still bounding. For the tank failure scenarios identified in the Final EIS, DOE again reviewed the modeling method. The major parameters used to estimate the release have remained the same. The change in the footprint of the release (three tanks instead of five tanks) has negligible impact on the overall groundwater impact. Since release parameters have not changed, the release to the vadose zone scales linearly with inventory. Because DOE used that conservative assumption and the waste quantities of radiological and hazardous constituents are less than originally projected, DOE determined it was not necessary to perform additional groundwater modeling for the accident scenarios.

A similar review was performed for the air emissions. This comparison included radionuclides, Hazardous Air Pollutants, and Toxic Air Pollutants using the updated composition of SBW versus the composition used in the FEIS. The review found that there are no new significant circumstances, information, or change in the composition data that would result in significant changes to the environmental impacts presented in the FEIS.

4.3 Latent Cancer Risk Calculation

Table 4 presents a comparison of a representative sample of the data presented in Table C.3-1, Table 3-2, and Table 3-8 of the Final EIS using the old calculation method to the same data using the new calculation method (see Section 3.3). The activities used for this comparison were chosen to represent the highest estimates of potential impacts.

The comparisons show there is no significant difference in the information presented in the Final EIS using the old method versus using the new method for Involved Workers (Construction, Operations, and Facility Disposition). DOE also reviewed the transportation and air latent cancer fatality risk presented in the Final EIS for the public and determined that the risks presented in table 4 compared to those identified in the Final EIS represent those estimated risk values. Therefore, a specific comparison for these areas was not performed.

DOE also compared the accident scenario results presented in the Final EIS versus estimates using the new guidance. The activities that were used for this comparison were chosen to represent the highest estimates of potential impacts. Table 4 presents the results of those calculations. Although some results indicate an increase in potential latent cancer fatalities in the public, accidents are unforeseen events and there is inherent conservatism in the analysis. DOE determined that there is no significant difference in the information presented in the Final EIS versus the new guidance.

Table 4 – Comparison of Radiological Information Presented in the Final EIS Versus New EH Guidance for Calculation of Potential for Latent Cancer Fatality

Final EIS		Revised Risk Values based on 2003 EH guidance
Project Description	Estimated increase in latent cancer fatalities (one significant figure)	Estimated increase in latent cancer fatalities (one significant figure)
Table C.3-1 Estimated radiological impacts during construction activities to involved workers by project		
Planning Basis Option	0.08	0.1
Steam Reforming Option	0.05	0.08
Table C.3-2. Estimated radiological impacts during operations to involved workers by project)		
Planning Basis Option	0.4	0.6
Direct Cement Option	0.4	0.7
Steam Reforming Option	0.3	0.4
Table C.3-8. Estimated radiological impacts for disposition of existing facilities by project.)		
Clean Closure	0.8	1
Performance-Based Closure	0.04	0.07
Closure to Landfill Standards	0.02	0.03
Performance-Based Closure with Class A Fill	0.03	0.04
Performance-Based Closure with Class C Fill	0.03	0.04
Accident Description	Per capita risk to offsite population (LCFs/120,000 person – event/ one significant figure)	Per capita to offsite population (LCFs/120,000 person-event/ one significant figure)
Table C. 4-2. Summary of bounding facility accidents for the waste processing alternatives.		
Seismic induced failure of a bin set	0.002	0.003
Short-term flood induced failure of a bin set structure	0.0002	0.0003
External event causes failure of bin set structure	0.0005	0.0006
External event results in a release (HAW) from borisilicate vitrifcation facility	0.0006	0.0008

Source: NE-ID 2005a

4.4 Worker Lost Work Days Calculation

The CAIRS database is a database used to collect and analyze DOE and DOE contractor reports of injuries, illnesses, and other accidents that occur during DOE operations. Based on available data for 2004 (CAIRS database), Idaho Site rates are still representative of both construction and operations. These rates are 25.3 percent for contractor lost workdays and 1.2 percent for total recordable cases. DOE rates are 24.4 percent for lost workdays and 1.6 percent total recordable cases. DOE has concluded based on the 2004 Idaho Site data that the total recordable cases have continued to trend downward and total lost workdays are essentially the same.

The Final EIS Table C.3-3 from Appendix C-3 – Health and Safety was used to perform a comparison of the results in the FEIS versus the 2004 rates. Table 5 presents a comparison of a representative sample. The activities used for this comparison were chosen to represent the highest estimates of potential impacts. The comparative results show that the number of Lost Work Days per year and the number of cases are lower than that presented in the Final EIS.

Table 5 – Comparison of Worker Safety Information Presented in the Final EIS Versus 2004 Information From the CAIRS Database

Final EIS			Revised Values based on 2004 CAIRS[1] data[2]	
Table C.3-3. Worker safety during construction – peak year employment levels.				
Alternative/Option Description	Lost Work Days/Year	Number of Recordable Cases/Year	Lost Work Days/Year	Number of Recordable Cases/Year
No Action Alternative	6	0.78	5	0.25
Continued Current Operations Alternative	25	3.3	23	1.1
Separations Alternative				
Full Separations Option	240	32	215	10
Planning Basis Option	250	32	220	10
Transuranic Separations Option	190	25	172	8
Non-Separations Alternative				
Hot Isostatic Pressed Waste Option	100	13	91	4
Direct Cement Waste Option	110	15	101	5
Early Vitrification Option	93	12	83	4
Steam Reforming Option	160	20	139	7
Minimum INEEL Processing Option	56	7.3	51	2.4
Direct Vitrification Alternative				
Vitrification without Calcine Separations Option	100	13	89	4
Vitrification with Calcine Separations Option	190	25	170	8

1 - CAIRS – DOE Computerized Accident/ Incident Record Keeping and Reporting System
2 - Source: NE-ID 2005b

5.0 Conclusions

DOE's review of the Steam Reforming Process proposed by the Idaho Cleanup Project Contractor shows that the estimated impacts are adequately represented by the information presented by Final EIS. In addition, the results from DOE's review of the updated waste compositions for the SBW, the HLW Calcine, and the new calculation methods for worker safety and latent cancer risk also show that the impacts are adequately represented by the information presented by Final EIS.

6.0 Determination

DOE performed this Supplement Analysis on the Idaho High-Level Waste and Facilities Disposition Final Environmental Impact Statement, in accordance with 40 CFR 1502.9 (c) and 10 CFR 1021.314, on the Idaho Cleanup Project activities related to sodium bearing waste treatment, calcine disposition path forward, and facility disposition. Based on this analysis DOE has not made substantial changes in the proposed action that are relevant to environmental concerns, and there are no new circumstances or information relevant to environmental concerns that bear on the proposed action or its impacts.

Therefore, DOE has determined that a Supplemental Environmental Impact Statement is not required.

Approved

Elizabeth D. Sellers
Manager